Models of development and types of nations

Heintz, Peter

MODELS OF DEVELOPMENT AND TYPES OF NATIONS

Peter Heintz

According to the paper on "A Typology of Nations" by M. Dechmann et.al, BULLETIN No. 11, December 1968, the following types of nations form a sequence in terms of levels and other dimensions of development: Traditional feudal societies (TFG) - modernizing sectionalist societies (S) - mobilization system societies (MS) - M-societies (= residual group of societies which do not belong to any of the preestablished types) - modern industrial societies (MIG).

1) Let us assume that the pattern T/I is positive as well as the pattern $\Delta I/\Delta T$. These linear patterns correspond to underdevelopment in terms of the theory of the social system including propositions which refer to the interference by the units with the working of the system as a consequence of the scarcity of goods.

   The indicators of Argüello's development Model 3 are:
   $T/\Delta I$: + and $\Delta I/T$: +.

   The indicators of Argüello's development Model 1 are:
   $T/\Delta I$: - and $\Delta I/T$: -.

   If the units corresponding to the assumed patterns behaved according to the indicators of Model 3 their movement would

accelerate in the course of time. This acceleration can also be described as a tendency to expand the system.

If the units of the system behaved according to the indicators of Model 1 their movement would slow down in the course of time. This movement could also be described as a tendency of the system to shrink.

According to the data provided by Dechmann et.al there are two types of societies which correspond to the positive pattern between T and I :

S-Societies: T_{50}/I_{55} : .38
T_{55}/I_{60} : .58
$T_{50}/\Delta_{50-55}I$: .45
$T_{55}/\Delta_{55-60}I$: .49
$\Delta_{50-55}I/T_{60}$: .55
$E\text{-}I_{50}/\Delta_{50-55}I$: .38
$E\text{-}I_{55}/\Delta_{55-60}I$: .56
$\Delta_{50-55}I/E\text{-}I_{60}$: .46

MS-Societies: T_{50}/I_{55} : .18
T_{55}/I_{60} : .16
$T_{50}/\Delta_{50-55}I$: -.05
$T_{55}/\Delta_{55-60}I$: -.15
$\Delta_{50-55}I/T_{60}$: -.19
$E\text{-}I_{50}/\Delta_{50-55}I$: .30
$E\text{-}I_{55}/\Delta_{55-60}I$: .29
$\Delta_{50-55}I/E\text{-}I_{60}$: .38

As one can observe the S-societies approximate more the positive pattern between T and I than the MS-societies. Both types of societies develop according to Model 3, the S-type in terms of T and E-I, the MS-type only in terms of E-I.

Both types of societies correspond to relatively low levels of development. This confirms the hypothesis according to which the assumed pattern is located in the phase of underdevelopment as characterized by the modified theory of the social system. In addition, both types choose the model which - within the assumed pattern - represents a tendency of the system to expand.

2) Let us assume the existence of a negative pattern between T and I as well as between ΔT and ΔI. This pattern corresponds to intermediate levels of development in terms of the theory of the social system including propositions which refer to the interference by the units with the working of the system on its highest and lowest levels.

If the units of the system behaved according to the indicators of Argüello's development Model 3 their movement would slow down in the course of time, in other words, the system would shrink.

If, on the contrary, the units behaved according to the indicators of Argüello's development Model 1 their movement would accelerate, in other words, the system would expand.

According to the data provided by the authors of the paper on "A Typology of Nations", there is only one type of society which corresponds to the assumed negative pattern and the movement of which can be described in terms of the indicators of one or the other of the two development models mentioned above. This type of society is M which is located

between the MS-societies and the modern industrial societies (MIG).

M-Societies: T_{50}/I_{55} : -.42

T_{55}/I_{60} : -.55

$T_{50}/\Delta_{50-55}I$: -.43

$T_{55}/\Delta_{55-60}I$: -.28

$\Delta_{50-55}I/T_{60}$: -.67

$E\text{-}I_{50}/\Delta_{50-55}I$: -.09

$E\text{-}I_{55}/\Delta_{55-60}I$: -.04

$\Delta_{50-55}I/E\text{-}I_{60}$: -.35

As one can observe the M-societies which correspond to the negative pattern between T and I choose the development Model 1. Consequently, we may say that they adopt the model which produces a tendency towards expansion of the system.

The traditional feudal societies as well as the modern industrial societies are not included in our previous discussion because they do not fulfil the assumption of a positive or negative pattern between T and I and/or do not fit into the development Model 1 or 3. These two types of societies represent extreme values on the development variables.

MIG-Societies: T_{50}/I_{55} : -.73

T_{55}/I_{60} : -.80

$T_{50}/\Delta_{50-55}I$: .03

$T_{55}/\Delta_{55-60}I$: .43

$\Delta_{50-55}I/T_{60}$: -.22

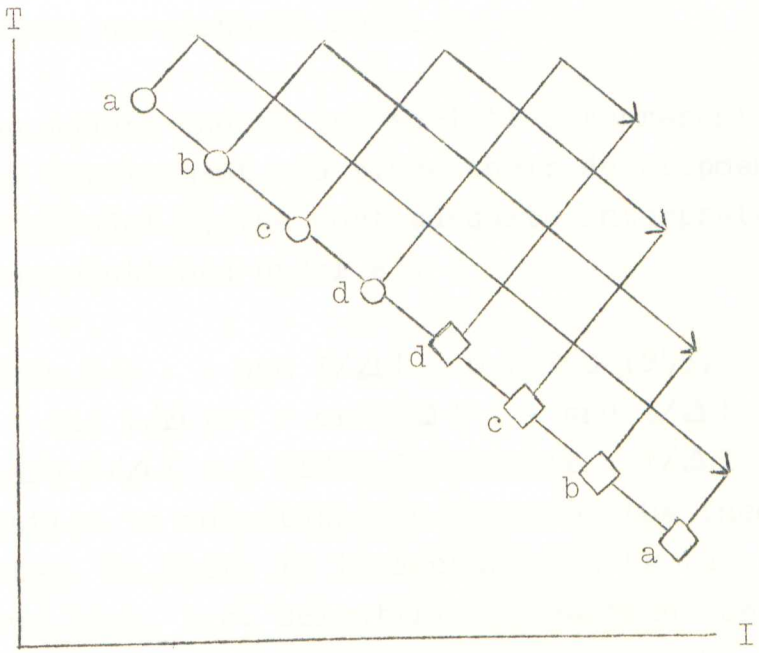
$E\text{-}I_{50}/\Delta_{50-55}I$: .04

$E\text{-}I_{55}/\Delta_{55-60}I$: .36

$\Delta_{50-55}I/E\text{-}I_{60}$: -.44

As one can observe the modern industrial societies show a negative pattern between T and I as do the M-societies. On the other hand, they do not fit neither into Model 1 nor into Model 3.

The pattern of these societies: $T/\Delta I$: + and $\Delta I/T$: - is located within the negative pattern between T and I. This implies that even very small changes in the values of T produce very strong variations of ΔI. This may be represented in the following way:



Consequently, the pattern $T/\Delta I$: + and $\Delta I/T$: - does not presuppose any process of saturation different from the one implied in the slowing down of the movement of the units due to the combination of a negative pattern between T and I and the presence of the indicators of Model 3. There are two interpretations for the particular configuration of modern industrial societies:

a) It reflects the constitution of a system characterized by a strong interference by the units with the working of the system due to the abundance of goods.

b) It reflects the particular configuration of units on intermediate levels of development in the absence of any interference by the units with the working of the system due to the abundance of goods.

The particular configuration of the M-societies cannot be interpreted in terms of hypothesis a) since their movement fits into development Model 1.

Since the modern industrial societies represent the highest levels of development and since their development fits into Argüello's Model 4, the most adequate interpretation seems to be the one mentioned under a).

The pattern $T/I : -$ and $T/\Delta I : 0$ (1950-1955) implies: $T/\Delta I : +$ and $I/\Delta I : +$ or $T/\Delta I : -$ and $I/\Delta I : -$. The pattern $T/I : -$ and $T/\Delta I : +$ (1955-60) implies: $I/\Delta I : -$. This last configuration is not stable in terms of the theory of the social system. In fact, it is accompanied by the emergence of a new status line, i.e. scientific production (see H.P. Wiederkehr, Science as an Instrument of Politics, in this Bulletin).

We guess, on the basis of theoretical considerations, that the world sample of societies will reflect better than any subsystem the constitution of the total system, in other words, that it will show to a smaller degree the interference by the units with the working of the system. For this reason, we hypothesize that the pattern between T and I will be negative.

World Sample: T_{50}/I_{55} : -.33

T_{55}/I_{60} : -.46

$E\text{-}I_{50}/\Delta_{50\text{-}55}I$: .20

$E\text{-}I_{55}/\Delta_{55\text{-}60}I$: .23

$\Delta_{50\text{-}55}I/E\text{-}I_{60}$: -.33

The hypothesis concerning the pattern between T and I is confirmed.

The model of development in terms of E-I corresponding to the world pattern coincides with the model which fits the modern industrial societies during the period 1955 to 1960. We observe the interference of the high units due to the abundance of goods and the absence of any interference of the low units due to the scarcity of goods. The pattern fitting into Model 1 on the intermediate levels of development as well as the interference of units on low levels of development disappear. The combination of the negative pattern between T and I with $T/\Delta I$: + and $\Delta I/T$: - means that the system tends to shrink. The same is true for the modern industrial societies. However, we have to take into account that ΔI does not measure growth in absolute terms.

Traditional Feudal Societies: T_{50}/I_{55} : .13

T_{55}/I_{60} : -.02

$T_{50}/\Delta_{50\text{-}55}I$: .32

$T_{55}/\Delta_{55\text{-}60}I$: -.12

$\Delta_{50\text{-}55}I/T_{60}$: .12

These values show that it is not possible to incorporate the traditional feudal societies into our assumption of a positive or negative pattern between T and I. According to these findings

the TFG-societies seem to be outside the field in which the theory of the social system can be applied to the international system. This is true not only for the theory in its most simple form but also for the one which includes propositions concerning the interference of the units with the forces of the system.

It is important to note that the different types of societies with the exception of the modern industrial ones tend to choose - on the basis of their T/I-pattern - the model of development which implies a tendency to expand the system. This may be interpreted as a consequence of the tendency to make use for the purpose of development of the level of development achieved.

Furthermore, we observe that the types S and M show the best development effect with respect to one or the other of the two principle development models whereas the MS-societies which are located between the S- and M-societies seem to be less successful with the model (3) they have adopted. This fact may be interpreted in a way which is in accordance with other findings. It may be the consequence of the fact that - on the level of development of the MS-societies - the possibilities of upward mobility offered by the development Model 3 gradually come to an end. The exhaustion of these possibilities is reflected by the fact that the disequilibrium of the type U-I does not make any positive contribution to development. Such a disequilibrium probably points to the existence of a pattern of centralized development interpreted as a way of achieving a relatively autonomous development. The possibilities of autonomous development included in this pattern are probably limited by the lack of technological development (see H.P. Wiederkehr, Science as an Instrument of Politics, in particular the determinants of the expenditures of industry for research and development).

This lack of technological development on the level of the MS-societies can explain not only the change from development Model 3 to Model 1 in the M-societies, but also the successful working of this last model in terms of development effects on the intermediate levels of development.

In the following we compare our previous findings with the patterns shown by the provinces of Argentina.

Totality of Provinces:	T/I (1947)	:	-.61
	T/I (1960)	:	.19
	$T_{47}/\Delta_{47-60}^{I}$	:	.43
	$\Delta_{47-60}^{I}/T_{60}$	:	.20

This configuration (1947) corresponds in theoretical terms to a global system characterized by the negative pattern between T and I and the presence of the indicators of Model 3. The combination of this negative pattern with Model 3 implies a tendency of the system to shrink. The configuration is similar to the one we observe in the world system. It is highly unstable as shown by the change of the T/I-pattern from negative to slightly positive between 1947 and 1960. This change may be interpreted as an increasing openness of the system and a consequent tendency towards a configuration combining T/I: + and development Model 3.

Low Provinces (I):	T/I (1947)	:	-.23
	T/I (1960)	:	.01
	$T_{47}/\Delta_{47-60}^{I}$	:	.62
	$\Delta_{47-60}^{I}/T_{60}$	:	.64

The configuration of the low provinces is similar to the one of the total system. However, the pattern between T and I in 1947 is less clear than the one which corresponds to the

totality of provinces. It is important to note that in theoretical terms the low provinces in 1947 do not reflect any interference by the units with the working of the global system. In this respect, they differ from the underdeveloped societies of type S and MS in the international system. This difference may be explained by the fact that the provinces have much less autonomy with respect to their global system than the nations with respect to theirs, or by the fact that the provinces have reached a level of development on which there is no interference with the working of the system due to the scarcity of goods. In addition, we observe the same tendency to change the T/I-pattern between 1947 and 1960.

High Provinces (I):	T/I (1947)	-.12
	T/I (1960)	.01
	$T_{47}/\Delta_{47-60}{}^{I}$	.61
	$\Delta_{47-60}{}^{I}/T_{60}$	-.20

Apart from the fact that the negative correlation between T and I for 1947 and 1960 is insignificant, we observe that the configuration of the high provinces coincides with the one of the modern industrial societies and with the international system in terms of $T/\Delta I$: + and $\Delta I/T$: -. In other words, this configuration fits into Argüello's Model 4.

CENTRALIZED AND DECENTRALIZED DEVELOPMENT OF NATIONAL SUBUNITS

Jean-Pierre Hoby / Brigit Schindler

1. Introduction

This paper tries to explore if the development model valid for the international system can be applied to national subunits - in this case to the Swiss cantons.

The theory used postulates that the lower the I values the greater the difference of accessibility between E and U on the one hand and I on the other, and that the lead of U and E over I constitutes a development drive with regard to economic growth.

From this the question arises:
How does an already highly developed system further develop?

2. The Variables

2.1 Source of the Data

The sources of our data are publications of the Federal Bureau of Statistics on the census of 1960. If not otherwise indicated the data refer to 1960. The data on income distribution are taken from G. Fischer: "Das Volkseinkommen der

Kantone 1960-65", in: Wirtschaft und Recht, No. 4, 1967.

2.2 Operationalization of the Variables

I	Income per capita
$\Delta I_{50/60}$	Index growth of I between 1950 and 1960 or
$\Delta I_{60/65}$	between 1960 and 1965
U	Number of inhabitants in cities with more than 10'000 inhabitants as percentage of the total population of the canton
ΔU	Growth rate of U between 1950 and 1960
E_{pot}	Measure of formal education provided by all educational institutions[1)]
LD	Horizontal differentiation of the occupational structure based on the distribution of economic sectors
ΔLD	Growth rate of LD
ES	Vertical differentiation of the occupational structure operationalized as the share of the Swiss and foreign population in middle and higher occupations as percentage of the total of the economically active population
prim	Percentage share of the primary sector out of the total economy
sec	Percentage share of the secondary sector out of the total economy
tert	Percentage share of the tertiary sector out of the total economy

1) See H. Ries, B. Orban et.al: Construction of Differentiated Educational and Occupational Variables, in: Bulletin 10, 1968, pp. 1

Δ prim
Δ sec
Δ tert
} Growth rate of the sector between 1950 and 1960

T=(E-I)+(U-I) Development tension

NONA-U Indicator of the non-urban and non-agrarian sector, operationalized as percentage share of the economically active population not working in agriculture (NONA) and not living in urban contexts.

T_{dec} = ((NONA-U)-I)+(E-I) Indicator of decentralized development

3. Theoretical Considerations

As a national unit Switzerland belongs to the international upper stratum which is characterized by negative associations between I and Δ I as well as between I and T. There is a positive association between I and E and a zero relationship between I and U[1].

We expect that the same or similar correlations will also be found among the national subunits of Switzerland. There is, indeed, a negative association between I and Δ I as well as between I and T, and there is a positive association between I and E. I and U, however, show a very strong positive correlation. Table 1 summarizes the correlations[2];

---

1) B. Orban, The International Upper Stratum: A Factor Analysis, in: Bulletin 7, 1968, pp.93.

2) Interpreting the correlations it has to be kept in mind that all of them are Pearson's product-moment correlations.

Table 1

	International Upper Stratum	Switzerland
$I/\Delta I$	-.57	-.55
I/T	-.79	-.64
I/E	.64	.59
I/U	.05	.86

If the variable T is divided into its two components, it appears that, in the case of Switzerland, the negative relationship between I and T is mainly due to E-I. The negative association between I and E-I is double the association between I and U-I.

The correlation coefficients are the following:

Table 2

	International Upper Stratum	Switzerland
E-I/I	-.81	-.67
U-I/I	-.54	-.32

The E/I scattergram (see Figure 1) shows a clear lead of E for the units with lower I, whereas the units with higher I can be characterized by a lead of I.

However, the I/U scattergram does not show a similar difference between the two groups of cantons (see Figure 2).

Figure 1


T
E pot.
GE
BS
ZH
NE
BL
SH
VD
ZG
SO
GL
BE
AG
TG
SG
LU
OW
GR
NW
SZ
FR
UR
TI
VS

Figure 2


BS
GE
ZH
NE
SH
BL
VD
ZG
FRE
SO
EVG
TG
SG
LU
TH
GR
OTI
SZ
FR
VS
NW
BE
UR
OW
GL
H
LU

4. Centralized and Decentralized Development

The centralized pattern of development of a context is characterized by the existence of one or a few poles which develop more rapidly than the rest of the context. Such a pattern exists among the countries belonging to the international lower stratum and may be described in terms of the pattern of this stratum:

a) $I/\Delta I$: + $T/\Delta I$: + T/I: +

This pattern presupposes a positive association between T and ΔI. Another pattern of centralized development presupposes a negative association between T and ΔI (see Argüello's Model 1). It may be described in the following way:

b) $I/\Delta I$: + $T/\Delta I$: - T/I: -

The pattern of decentralized development is characterized by the fact, that the differences between the more developed poles and the rest of the context are decreasing. This process is expressed by a negative association between the rate of economic growth and the level of development. The two patterns of decentralized development characterized by $T/\Delta I$: + or $T/\Delta I$: - are the following:

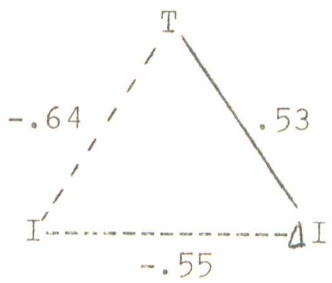
a) $I/\Delta I$: - $T/\Delta I$: + T/I: -

b) $I/\Delta I$: - $T/\Delta I$: - T/I: +

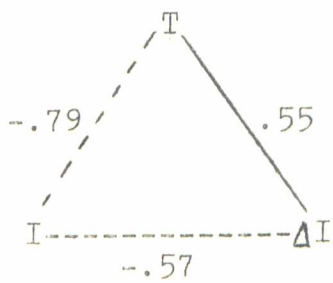
Pattern a) corresponds to the one found among the nations belonging to the international upper stratum.

Switzerland as a system of cantons falls, as is to be expected, into this pattern:

Switzerland



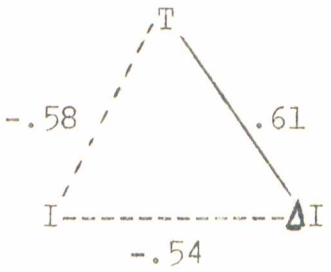
International Upper Stratum



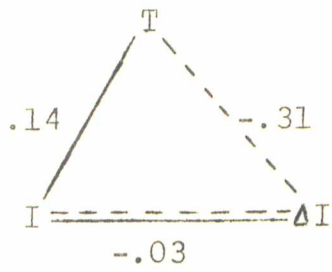
The same is not true if we divide the Swiss cantons into two groups according to their income level. A group of 12 cantons was considered as having high I and another of 13 cantons as having low I.

T, I and ΔI are correlated as follows:

I low



I high



The cantons with low I correspond exactly to the pattern of decentralized development (a) (I/ΔI: -, T/ΔI: +, T/I: -), whereas it is more difficult to interpret the configuration of the cantons with high I. The scattergrams (see Figures 3, 4 and 5) confirm these relationships.

Figure 3

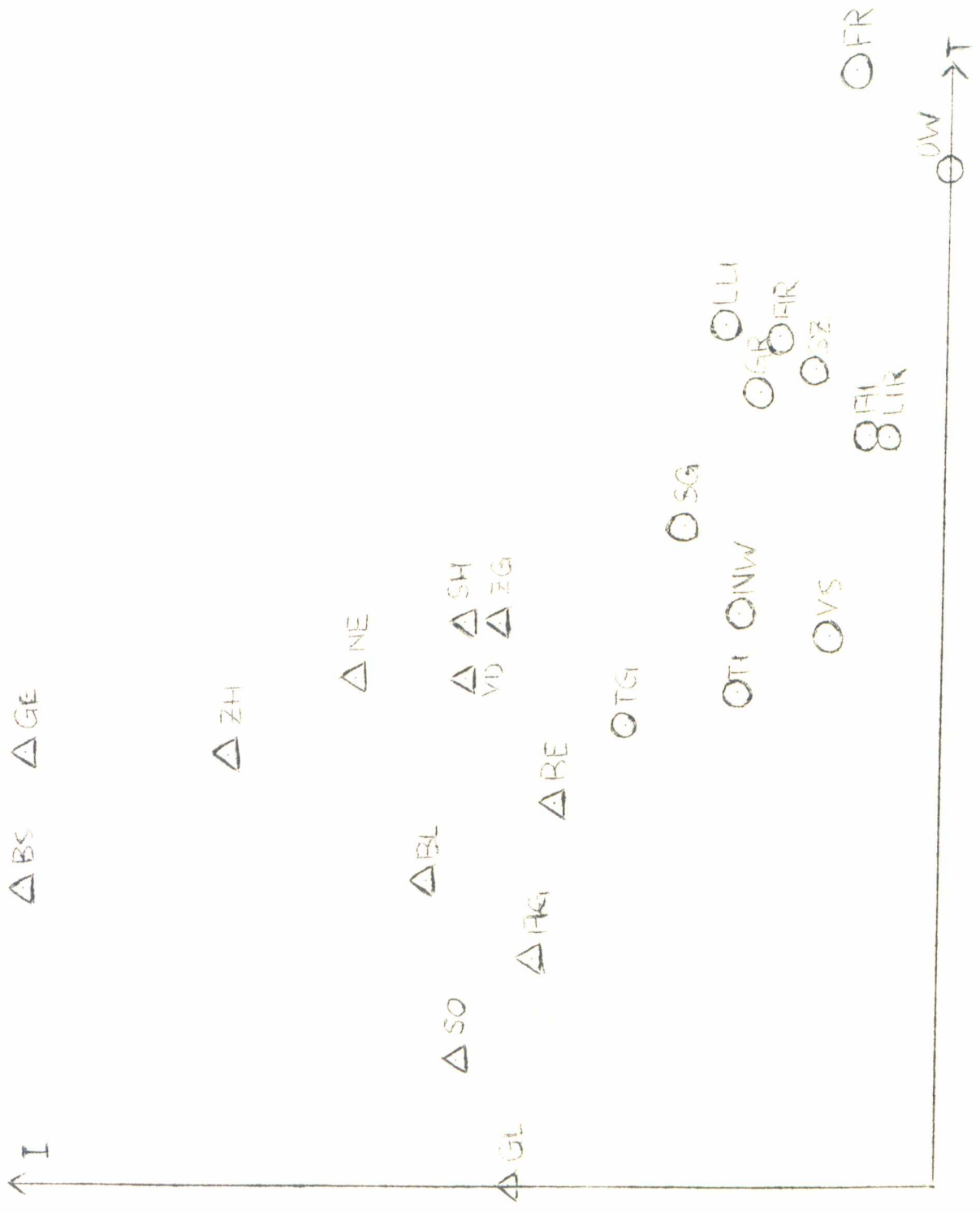

I
T
GL
SO
AG
BL
RE
TG
NE
ZH
SH
ZG
VD
BS
GE
SG
NW
OW
FR
LU
GR
FR
SZ
BE
UR
VS

Figure 4

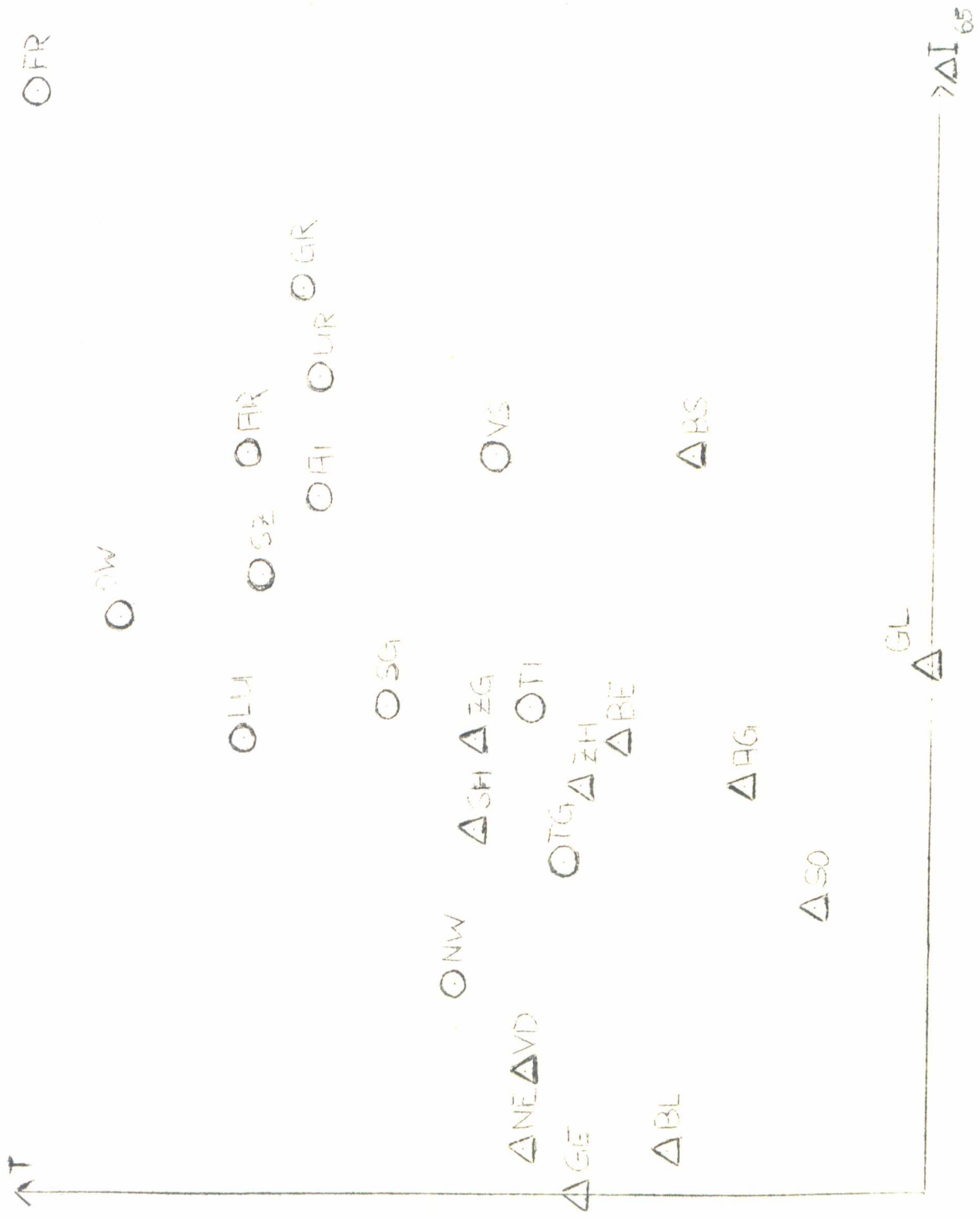

FR
NW
SZ
FR
UR
GR
LU
SG
VS
BS
SG
TI
SH
ZG
ZH
BE
TG
BG
GL
SO
NW
NE
VD
GE
BL
T
ΔI65

Figure 5


ΔI65
I
GE
ΔRS
ΔZH
ΔNE
ΔBL
ΔVD
ΔSO
ΔSH
ΔZG
ΔGL
ΔFG
ΔBE
ΔTG
ΔSG
ΔLU
ΔOW
ΔNW
ΔSZ
ΔHR
ΔGR
ΔVS
ΔHI
ΔUR
ΔFR

The configuration of the high cantons shows a certain affinity with the pattern of decentralized development (b): $I/\Delta I$: -, $T/\Delta I$: -, T/I: +. However, the principal criterion for decentralization, i.e. $I/\Delta I$: -, is not fulfilled. The highest cantons even show a tendency toward a positive association together with negative associations between T and ΔI and between T and I. (See Figure 5: BS, ZH, NE, BL and VD) This configuration corresponds to the pattern of centralized development (b).

It has been mentioned before that the cantons with low I show little urbanization and, consequently, the decentralized development pattern (a) seems to be associated with low urbanization.

Based on the assumption that the tension resulting from the lead of NONA-U (indicator of the non-agrarian and non-urban economic sector) over I may have a positive effect on ΔI, an attempt was made to construct a development drive variable which would characterize the decentralized development pattern.

The development tension of the decentralized development pattern was operationalized as follows:

$$T_{dec} = ((NONA\text{-}U)\text{-}I) + (E\text{-}I)$$

For the whole of Switzerland the correlation between T_{dec} and $\Delta I_{60/65}$ is .52 (Spearman: .63). The correlation would be much higher if the strongly deviant cantons OW, NW and BS were eliminated. However, the association is tendentially negative among the cantons with the highest I (see Figure 6).

Figure 6


ΔI65
Tdec
FR
UR
GR
HR
YS
HI
SZ
OW
LU
SG
TI
ZG
BE
GL
TS
NW
VD
NE
BL
GE
SO
SH
ZH
BS

The cantons classified according to U show the following correlations:

Cantons	$T_{dec}/\Delta I$
U_{low} :	.59
U_{high}:	.44

Comparing the two scattergrams $T/\Delta I$ and $T_{dec}/\Delta I$ (Figures 4 and 6), we observe that the positive pattern for T_{dec} is much clearer, although the correlation coefficients do not differ very much.

5. Decentralization and Economic Sectors

The following relationships characterize the different economic sectors and their growth rates:

prim / Δ prim	-.79
sec / Δ sec	-.40
tert / Δ tert	.04

The correlations between U and the different sectors are as follows:

U / prim	-.74
U / sec	.02
U / tert	.67

The negative sec/Δ sec correlation and the absence of a correlation between U and sec may be considered as expressions of decentralized development.

The cantons with high U show a clearly negative association between U and Δ/sec. On the other hand, the cantons with low U show a slightly positive association between U and Δ/tert.

The correlations are as follows:

Cantons	U /Δ sec	U /Δ tert
U_{high}	-.75	.13
U_{low}	-.09	.23

In the cantons with high U the strongly negative association between U and Δ sec points to decentralized development. However, the cantons with low U do not show the same relationship.

6. Processes of Decentralization

There are three decentralization processes which can be distinguished in theoretical terms:

Assuming that:

$$T/I : -, \qquad T/\Delta I : + \qquad \text{and} \qquad I/\Delta I : -$$

The first process implies that the emigration out of the less developed units into more developed ones is slowed down by the relatively high level of socio-economic complexity of the less developed societal units (U-brake). This process is accompanied by a relatively autonomous development of low ranking units.

Assuming that:

$T/I : +$, $T/\Delta I : -$, $I/\Delta I : -$

the second process implies that the emigration is slowed down by the positive association between T and I. This process fits into the pattern of the high cantons (with the exception of the highest ones).

The third process of decentralized development, based on:

$T/I : -$, $T/\Delta I : +$, $I/\Delta I : -$

requires:

a) units with a power excess, produced as a consequence of a previous positive association between I and Δ I and a negative association between T and Δ I (= centralized pattern b), but with a diminishing rate of transformation of power into economic growth (= $I/\Delta I$ tends towards zero) and

b) capital transfers from these units to units with less power excess and lower level of development ($T/I : -$). This pattern reverses the previous determinants of economic production (Δ prod): the positive association between I and Δ prod will become negative, and the negative association between T and Δ prod will become positive (Δ prod doesn't fully coincide with Δ I because of the transfer of benefits and interests to the capital exporting units).

It may be that in Switzerland these three processes of decentralization coexists, the first one among the less developed cantons, the second one among the more developed cantons and the third one within the total system.

The third process of decentralized development follows upon a particular pattern of centralized development characterized by the capitalist model of development (= pattern of centralized development (b).

On the other hand, the first process of decentralized development may be followed by a centralized development pattern (a) which characterizes underdeveloped countries. However, the third process of decentralized development within the total system may, for the time being, delay the initiation of a centralization process among the low ranking cantons.

In other words, we assume that the first and third process of decentralized development interact in a rather complicated way. The third process may give some support to the first one.

But before this (and even now with respect to the highest cantons corresponding to centralized pattern b), the first process may have supported the capitalist centralized development pattern, slowing down the concentration of human resources in the development poles of the centralized pattern among the high ranking cantons.

7. The Determinants of the Urbanization Process

7.1 Operationalization of Additional Variables

SECT Indicator of sectionalism, i.e. the division of the political system into comparatively small subunits, operationalized as the number of communities in comparison to the total population.

KH Indicator of the heterogeneity of culture, operationalized with respect to the linguistic and confessional distribution and the percentage share of foreigners.

POP Total population of the cantons, foreigners included

D Inhabitants per area (density)

7.2 The Theory of the U-Brake

According to Ries et.al (Bulletin 3, 1967, pp.25) U is negatively correlated with:

- the degree of resistance of a traditional culture (cultural heterogeneity)
- the degree of division of the political system into comparatively closed and complex subsystems (sectionalism)
- the degree of economic self-sufficiency within a subsystem (NONA-U)

7.3 Application of the Theory of the U-Brake to Switzerland as a National Unit

In comparison with the values of I and E, the degree of urbanization of Switzerland is low. This fact, rather extraordinary for a modern industrialized society, may be explained by the theory of U-brake. The federal structure of Switzerland is an expression of the relative isolation of politically autonomous and - in part - economically independent national subunits which are culturally heterogeneous.

7.4 Application of the Theory of the U-Brake to Swiss Subunits

The most important variables included in the theory of the U-brake show the following correlations when applied to the cantons as units:

	Pearson	Spearman
SECT / U	-.40	-.44
NONA-U / U	-.95	-.94
KH / U	.38	.41

Contrary to the hypothesis, only SECT and NONA-U are negatively correlated with U, whereas KH shows a positive correlation.

This means that cultural heterogeneity does not have a braking effect on U. The cantons with the lowest U-values (UR, OW, NW, GL and AI) are, with the exception of GL, the culturally most homogeneous. The positive association may be explained by the heterogeneity of the recruiting fields of cities and - in connection with this - by the strongly positive association between I and U. In addition, I correlates strongly with migration: I/Mg .83.

It may be that cultural heterogeneity only serves as an effective U-brake in contexts where the development values have not yet become predominant.

7.5 Additional Hypotheses

The following hypotheses may be formulated:

(1) The degree of urbanization of a subunit is the higher, the higher its I-level and the greater the size of the secondary and tertiary sectors.

(2) The degree of urbanization of a subunit is the higher, the greater the population and the higher the density. This would explain why KH is positively correlated with U.

(3) The degree of urbanization is the lower, the higher the structural tensions ES-I, LD-I and E-I and the higher NONA-U.

7.6 Empirical Examination of the Hypotheses

(1) The variable I and tert show a positive correlation with U. The zero correlation between sec and U points to the independence of the secondary sector from urban centers. The intercorrelation I/sec and I/tert are positive, but sec and tert tend to exclude each other.

	Pearson	Spearman
I/U	.86	.81
sec/U	.02	.15
tert/U	.67	.51
I/sec	.23	.42
sec/tert	-.58	-.53
I/tert	.58	.34

(2) POP, D and KH are positively correlated with U and among each other:

POP/U	.40	.56
D/U	.64	.80
KH/U	.38	.41
POP/D	.07	.45
POP/KH	.24	.47
D/KH	.18	.23

(3) The structural tensions LD-I, ES-I and E-I as well as NONA-U are negatively associated with U and positively among each other:

	Pearson	Spearman
LD-I/U	-.36	-.31
ES-I/U	-.55	-.55
E-I/U	-.50	-.47
NONA-U/U	-.95	-.94
LD-I/ES-I	.72	.76
LD-I/E-I	.56	.61
ES-I/E-I	.76	.77
NONA-U/ES-I	.33	.36
NONA-U/LD-I	.29	.27
NONA-U/E-I	.31	.26

We hypothesize that decentralized development on the basis of high complexity of structure and/or capital transfer will show positive associations of LD-I, ES-I, E-I and NONA-U with Δ I and negative associations with Δ U.

	Pearson	Spearman		Pearson	Spearman
LD-I/ΔI	.42	.47	LD-I/ΔU	-.23	.02
ES-I/ΔI	.54	.57	ES-I/ΔU	-.18	-.02
E-I/ΔI	.48	.46	E-I/ΔU	-.31	-.23
NONA-U/ΔI	.24	.34	NONA-U/ΔU	-.21	-.49

In order to further test the hypotheses according to which these variables are determinants of urbanization, a factor-analysis was carried through.

The factor-analysis yielded the following results:

Of the three factors with an eigenvalue of more than 1.0 we will deal here only with the first, i.e. the urbanization factor.

The variables favouring U are located on the positive side, while the variables braking U appear on the negative side.

+		-	
I	95	NONA-U	-81
U	92	ES-I	-75
D	72	E-I	-69
tert	56	LD-I	-56
POP	42	SECT	-52
KH	38		
sec	23		

On the positive side, the variables I and D have the highest loadings, on the negative side the variables NONA-U, ES-I and E-I. The contribution of the secondary sector is positive but very low.

On the basis of the results of the factor analysis the factor scores for the cantons were calculated by multiplying the values of the cantons on each variable by the corresponding factor loading. Then and taking into account the signs, the different factor scores of each canton were added. These factor scores are, of course, strongly associated with U (Pearson: .87, Spearman: .83) since they contain the positive and negative conditions of urbanization.

Summary

Internal Development	Pattern	Characteristics
Cantons with low I	decentralized pattern (a) T/I: -.58 T/ΔI: +.61 I/ΔI: -.54	negative conditions for urbanization: complexity of the internal structure, U-brake
Cantons with high I	decentralized pattern (b) T/I: +.14 T/ΔI: -.31 I/ΔI: -.03	positive conditions for urbanization (POP, D, KH, I, sec, tert)
Development of the total System		
Switzerland	decentralized pattern (c) T/I: -.64 T/ΔI: +.53 I/ΔI: -.55 requires: a) units with power excess but diminishing economic growth b) capital transfer	capital flow supports the U-braking effect of the first decentralized pattern

Appendix

Sources of our Data:

Publications of the Federal Bureau of Statistics on the census of 1960.

The data on income distribution are taken from G. Fischer: "Das Volkseinkommen der Kantone 1950-65", in: Wirtschaft und Recht, No. 4, 1967.

Canton		I (stand.)	E_{pot} (stand.)	U (stand.)
Zürich	(ZH)	77.1	59.9	67.8
Bern	(BE)	41.9	14.6	37.1
Luzern	(LU)	24.1	31.0	38.9
Uri	(UR)	6.2	22.5	0.0
Schwyz	(SZ)	14.4	32.3	14.1
Obwalden	(OW)	0.0	39.7	0.0
Nidwalden	(NW)	22.4	34.7	0.0
Glarus	(GL)	45.5	16.6	0.0
Zug	(ZG)	47.3	45.7	37.5
Fribourg	(FR)	10.7	52.1	20.5
Solothurn	(SO)	51.4	14.1	28.2
Basel-Stadt	(BS)	100.0	58.6	100.0
Basel-Land	(BL)	55.6	25.3	45.5
Schaffhausen	(SH)	51.6	29.4	62.6
Appenzell-AR	(AR)	17.4	26.9	19.5
Appenzell-IR	(AI)	8.0	26.2	0.0
St. Gallen	(SG)	28.8	28.0	29.5
Graubünden	(GR)	20.9	39.4	16.9
Aargau	(AG)	43.3	23.6	13.5
Thurgau	(TG)	33.5	20.2	23.5
Tessin	(TI)	21.0	0.0	22.2
Waadt	(VD)	51.5	39.2	45.4
Wallis	(VS)	12.2	2.2	9.1
Neuenburg	(NE)	63.7	50.4	58.5
Genf	(GE)	99.8	100.0	73.1

Canton	$\Delta I_{1950/60}$(stand.)	$\Delta I_{60/65}$(stand.)	$\Delta U_{50/60}$(stand.)
ZH	22.5	37.0	10.1
BE	25.0	40.7	12.6
LU	27.5	40.7	14.8
UR	15.0	74.1	0.0
SZ	30.0	55.6	-1.5
OW	32.5	51.9	0.0
NW	12.5	18.5	0.0
GL	22.5	48.1	0.0
ZG	35.0	40.7	6.8
FR	40.0	100.0	4.8
SO	22.5	25.9	-3.3
BS	5.0	66.7	0.0
BL	22.5	3.7	100.0
SH	30.0	33.3	38.1
AR	35.0	66.7	3.1
AI	55.0	63.0	0.0
SG	12.5	44.4	8.1
GR	52.5	81.5	5.9
AG	27.5	37.0	2.2
TG	17.5	29.6	20.5
TI	30.0	44.4	11.0
VD	32.5	11.1	15.0
VS	100.0	66.7	4.6
NE	0.0	3.7	2.4
GE	35.0	0.0	2.6

Canton	$T_{orig.}$	$E\text{-}I_{orig.}$	$U\text{-}I_{orig.}$
ZH	-26.5	-17.2	- 9.3
BE	-32.1	-27.3	- 4.8
LU	21.7	6.9	14.8
UR	10.1	16.3	- 6.2
SZ	17.6	17.9	- 0.3
OW	39.7	39.7	0.0
NW	-10.1	12.3	-22.4
GL	-74.4	-28.9	-45.5
ZG	-11.4	- 1.6	- 9.8
FR	51.2	41.4	9.8
SO	-60.5	-37.3	-23.2
BS	-41.4	-41.4	0.0
BL	-40.4	-30.3	-10.1
SH	-11.2	-22.2	11.0
AR	21.6	9.5	12.1
AI	10.2	18.2	- 8.0
SG	- 0.1	- 0.8	0.7
GR	14.5	18.5	- 4.0
AG	-49.5	-19.7	-29.8
TG	-23.3	-13.3	-10.0
TI	-19.8	-21.0	1.2
VD	-18.4	-12.3	- 6.1
VS	-13.1	-10.0	- 3.1
NE	-18.5	-13.3	- 5.2
GE	-26.5	0.2	-26.7

Canton	$prim_{1950}$ (%)	$prim_{1960}$ (%)	$\Delta prim_{1950/60}$ (%)
ZH	8.1	5.4	-2.7
BE	19.9	14.6	-5.3
LU	25.2	18.5	-6.7
UR	26.1	18.0	-8.1
SZ	26.4	19.8	-6.6
OW	34.7	28.2	-6.5
NW	27.0	20.0	-7.0
GL	11.4	9.1	-2.3
ZG	16.3	10.7	-5.6
FR	35.9	27.4	-8.5
SO	11.3	7.7	-3.6
BS	1.0	0.7	-0.3
BL	12.6	7.4	-5.2
SH	14.9	9.8	-5.1
AR	17.3	13.9	-3.4
AI	36.1	32.4	-3.7
SG	17.2	12.6	-4.6
GR	29.6	20.4	-9.2
AG	16.2	10.7	-5.5
TG	22.9	16.7	-6.2
TI	19.4	11.9	-7.5
VD	19.3	12.8	-6.5
VS	42.0	25.5	-16.5
NE	9.6	6.6	-3.0
GE	4.5	3.0	-1.5

Canton	sec_{1950}(%)	sec_{1960}(%)	$\Delta sec_{1950/60}$(%)
ZH	47.5	49.4	1.9
BE	45.4	48.9	3.5
LU	39.7	44.9	5.2
UR	42.4	49.2	6.8
SZ	43.7	49.9	6.2
OW	33.7	39.8	6.1
NW	37.2	44.6	7.4
GL	64.5	68.8	4.3
ZG	48.7	56.2	7.5
FR	34.5	40.9	6.4
SO	62.9	65.4	2.5
BS	45.1	44.7	-0.4
BL	55.0	60.1	5.1
SH	56.5	61.2	4.7
AR	52.3	55.3	3.0
AI	43.2	43.9	0.7
SG	50.8	55.6	4.8
GR	30.4	39.6	9.2
AG	59.9	64.3	4.4
TG	51.8	58.3	6.5
TI	42.3	44.6	2.3
VD	37.0	41.1	4.1
VS	30.2	42.3	12.1
NE	57.5	60.8	3.3
GE	41.5	41.3	-0.2

Canton	$tert_{1950}$(%)	$tert_{1960}$(%)	$\Delta tert_{50/60}$(%)
ZH	44.4	45.0	0.6
BE	34.7	36.3	1.6
LU	35.1	36.4	1.3
UR	31.5	32.5	1.0
SZ	29.9	30.2	0.3
OW	31.6	31.9	0.3
NW	35.8	35.2	-0.6
GL	24.1	22.0	-2.1
ZG	35.0	33.1	-1.9
FR	29.6	31.6	2.0
SO	25.8	26.8	1.0
BS	53.9	54.3	0.4
BL	32.4	32.4	0.0
SH	28.6	28.9	0.3
AR	30.4	30.6	0.2
AI	20.7	23.7	3.0
SG	32.0	31.7	-0.3
GR	40.0	39.8	-0.2
AG	23.9	24.9	1.0
TG	25.3	24.9	-0.4
TI	38.3	43.2	4.9
VD	43.7	45.8	2.1
VS	27.8	32.1	4.3
NE	32.9	32.4	-0.5
GE	54.0	55.4	1.4

Canton	LD 1950 stand.	LD 1960 stand.	Δ LD 1950/60 stand.	ES 1960 stand.	NONA-U 1960 stand.
ZH	76.5	65.8	9.1	56.9	29.8
BE	49.4	42.1	21.2	55.6	53.2
LU	44.4	39.5	27.3	60.6	45.0
UR	37.0	32.9	30.3	37.5	90.6
SZ	34.6	26.3	21.2	40.7	71.9
OW	23.5	19.7	33.3	71.8	77.9
NW	44.4	35.5	18.1	44.9	87.0
GL	42.0	25.0	0.0	0.0	100.0
ZG	53.1	39.5	6.1	35.6	56.1
FR	18.5	19.7	45.5	68.1	57.5
SO	44.4	32.9	12.1	18.1	70.8
BS	100.0	92.1	12.1	63.9	0.0
BL	51.9	40.8	12.1	34.3	53.0
SH	44.4	34.2	15.2	51.9	30.7
AR	45.7	32.9	9.1	35.2	61.6
AI	7.4	0.0	27.3	77.8	70.1
SG	48.1	35.5	9.1	45.4	62.9
GR	50.6	46.1	27.3	62.5	60.8
AG	37.0	27.6	18.2	27.3	86.5
TG	32.1	22.4	18.2	35.6	64.2
TI	56.8	59.2	42.4	58.8	76.6
VD	70.4	67.1	27.3	61.1	46.7
VS	0.0	23.7	100.0	75.0	75.0
NE	54.3	40.8	6.1	22.2	38.8
GE	100.0	100.0	30.3	100.0	27.4

Canton	POP in 1000	POP stand.	D POP/km^2	D stand.	Sect orig.	Sect stand.	KH orig.	KH stand.
ZH	932.8	100.0	551.0	8.7	1.8	9.6	5.0	41.7
BE	883.4	94.6	129.0	1.8	5.5	30.5	4.0	33.3
LU	251.7	26.0	170.0	2.5	4.2	23.2	1.0	8.3
UR	32.0	2.1	30.0	0.1	6.2	34.5	0.0	0.0
SZ	77.8	7.0	86.0	1.1	3.8	21.0	0.0	0.0
OW	23.4	1.1	47.0	0.4	3.0	16.4	0.0	0.0
NW	22.3	1.0	81.0	1.0	5.0	27.7	0.0	0.0
GL	40.0	2.9	59.0	0.6	7.2	40.1	7.0	58.3
ZG	51.4	4.2	220.0	3.3	2.1	11.3	2.0	16.6
FR	159.2	16.0	95.0	1.2	17.8	100.0	7.0	58.3
SO	198.1	20.1	254.0	3.8	6.6	36.7	3.0	25.0
BS	224.3	22.9	6081.0	100.0	0.1	0.0	6.0	50.0
BL	143.7	29.8	346.0	5.4	5.0	27.7	5.0	41.7
SH	64.9	5.6	221.0	3.3	5.3	29.4	3.0	25.0
AR	48.9	3.9	202.0	3.0	4.1	22.6	2.0	16.6
AI	13.0	0.0	75.0	0.9	4.6	25.4	0.0	0.0
SG	337.6	35.3	168.0	2.4	2.7	14.7	3.0	25.0
GR	147.0	14.6	21.0	0.0	15.0	84.2	12.0	100.0
AG	355.4	37.2	257.0	0.9	6.5	36.2	5.0	41.7
TG	165.3	16.5	165.0	2.4	12.1	67.8	4.0	33.3
TI	193.0	20.9	70.0	0.8	12.9	72.3	2.0	16.6
VD	423.1	44.5	134.0	1.9	9.0	50.3	7.0	58.3
VS	177.3	17.9	34.0	0.2	9.5	53.1	6.0	50.0
NE	144.9	14.3	185.0	2.7	4.2	23.2	7.0	58.3
GE	251.5	25.9	919.0	14.8	1.7	9.0	9.0	75.0